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ABSTRACT

A study involving 48 primary grade learning disabled (LD) students was undertaken to determine the effects of word segmentation on reading transfer performance. Ss received training in one of three methods: final consonant segmented method (space between medial vowel and final consonant): initial consonant segmented method (space between the initial consonant and the medial vowel); and unsegmented method (no spaces). The number of correct transfer word responses was then recorded. Results indicated that Ss taught by either of the two segmented methods performed better in initial learning and transfer than those in the unsegmented group. Findings suggested that the provision of structural cues is more effective than drill and practice in teaching LD students to read. Segmentation was found to be effective in generalization as well as acquisition. (CL)

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Effect of Word Segmentation Training upon Learning Disabled Students' Transfer Performance in Reading Phonetically Regular Words

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The existence of reading difficulties among children who are identified as having learning disabilities is very pervasive (Frierson & Barbe, 1967; Wallace & McCoughlin, 1975). In a five-year follow-up study by Koppitz (1971), it was found that only 19 percent of children with learning disabilities functioned at their grade level in reading. In searching for effective instructional strategies helpful with these students, a plethora of methods and materials have been developed. The bulk of research data used to support these teaching strategies, however, focused primarily on initial learning and thereby largely ignored the issue of transfer. Children's ability to transfer the learned decoding skills to new words containing the same pattern is a fundmental presumption underlying phonics instruction. As increasingly more children are taught to read by the use of phonics and linguistic readers, it is important to study the variables that influence transfer.

Transfer effects of phonics training in reading were found to be significantly superior when sound-symbol correspondence was taught directly rather than left to inference (Bishop, 1964; Jeffrey & Samuels, 1967; Jenkins, Bausell, and Jenkins, 1972). In addition, several researchers consider sound blending a necessary component if phonic skills are to be highly transferable (Richardson & Collier, 1971; Muller, 1973; Fox & Routh, 1976; Carnine, 1977).

Concomitant with the important aspect of blending training is the relative effectiveness of different ways of breaking the phonetically regular consonant-vowel-consonant (CVC) words into components. Silberman and Coulson (1964) found that dividing a CVC word between the vowel

and final consonant (CV-C) rather than between the initial consonant and the vowel (C-VC) resulted in no differences in students' learning and transfer performances. On the other hand, a study by Fletcher (1973) with first graders showed that training on the C-VC patterns produced more positive transfer value than training on the CV-C patterns. A more complete investigation of this topic was conducted by Sullivan, Okada, and Niedermeyer (1971) who matched subjects on the basis of their pretest scores. Forty-eight first grade children were randomly assigned to either a single-letter (C-V-C) group or to a letter-combination(C-VC) group. The twenty-four subjects in each group were further divided into groups of high, middle, and low ability, with eight children per group. A significant interaction between the two teaching strategies and children's reading ability was revealed. High-ability children who received C-VC training make more correct transfer responses than those who received C-V-C training. However, low-ability children's transfer performance was found to benefit from C-V-C approach more than the C-VC approach.

The present study was primarily designed to answer the following research questions. First, do LD students learn faster and more accurately when they are taught to blend the initial consonant with the medial vowel as a cluster (e.g., ma-t, li-p, fo-x), when they are taught to blend the medial vowel and the final consonant (e.g., m-at, l-ip, f-ox), or when they are simply given practice on these phonetically regular words unsegmented (e.g., mat, lip, fox)? Second, will the LD children who have been trained to criterion on these words by one of the three methods perform better on transfer words of the same pattern than those children trained by a different method? Finally, are the CVC words more or less transferable than the Consonant-Vowel-Consonant-Silent E (CVCE) words?

Method

Experimental Design

A 3x2 factorial arrangement of treatments, including the three teaching methods and the two spelling patterns, was designed to investigate the function of the two independent variables. The dependent variables used to determine whether there were any significant main effects and interaction effects were: Number of trials to reach mastery criterion and number of correct transfer responses.

Subjects

The potential subject pool included seventy-two first through third grade children who were already placed in learning disability resource rooms. Eighteen of the seventy-two children were excluded from the study since they were able to read correctly more than 20% of the pretest words. Six more subjects, all of them being first graders, were dropped from the study because they failed to reach the 80% mastery criterion on the initial learning task after a maximum of twelve trials or 45-minutes of training time elapsed.

A total of forty-eight subjects, five first-graders, twenty second-graders, and twenty-three third-graders were finally included in the sample. The mean age of the thirty-six boys and twelve girls was ten year-old. The mean IQ on the WISC Full Scale is 99.23 with a range from 80 to 131. In general, the sexes, the grade placement and the IQ levels were equated across all the groups.

Materials

Three comparable sets of word lists containing 10 meaningful words of either the CVC or the CVCE pattern were developed. Two of the three sets were randomly selected to constitute the 20-word pretest word lists. The third set of 10 words was then used as the transfer word list. Flash cards

were used as the training materials for all treatment groups. Words used for the Final Consonant Segmented groups, however, contain a half-inch gap between the medial vowel and the final consonant. The half-inch space for words used for the Initial Consonant Segmented groups appeared between the initial consonant and the medial vowel. Letters were equally spaced for words within the Unsegmented groups.

Procedure

The procedure was identical for all groups in Stages I and III, but the training procedure in Stage II differed. All of the subjects were tested and instructed individually.

Stage I - pretest: Before the pretest procedure began, a few minutes were spent in casual conversation to put the subject at ease. Then the experimenter read verbatim the following instructions: "I'm going to teach you to read some words. Before we start, I want to see how well you can read these words on this list. Read them out loud from left to right, starting here. Do you have any questions?" In all cases, corrections were not provided for any errors made. A six-second hesitation was allowed for each word, after which, had subjects not begun to say the word, they were asked to read the next word. The number of correctly read words was recorded.

Stage II - training. After the subjects were pretested, they received training in one of the three methods:

(1) Final Consonant Segmented Method (FS): The subjects in this condition were told to say each of the stimulus words presented on the flash cards. If subjects responded incorrectly or failed to respond after an interval of approximately four seconds, the two sound components were pronounced by the experimenter first, and then blended into the word. The subject was asked to imitate the experimenter's pronunciation and blending. Immediately

after a subject finished saying the blended word, the next flash card was presented in the same manner. Once through the twenty cards constituted a trial. Upon completion of each trial, the cards were shuffled to avoid a fixed order of presentation. The number of words correctly read without the experimenter's prompting was recorded.

(2) Initial Consonant Segmented Method (IS): The procedure was identical to that used for the FS method except that the subject was trained to blend the initial consonant and the medial vowel-final consonant units together. For example, the experimenter would point to the printed stimulus "r" while saying the /r/ sound, and then point to "am" while saying the /am/ sound, and finally blend them together and say /ram/.

(3) Unsegmented Method (US): The subject was simply requested to say the word upon presentation of each flash card. The subject was not prompted to blend the sounds. Instead, the experimenter simply said, "This word is /ram/. Repeat after me, /ram/." The subject then looked at the word and said it.

Stage III: Transfer Test. The transfer test was administered immediately after a subject reached the 80 percent mastery criterion. The following instructions were read: "Here is a different list of words I would like you to read out loud. Do your best, and don't be afraid to make guesses if you are not sure." During the transfer test, responses were neither corrected nor confirmed. The number of correct transfer word responses was recorded.

Results

Number of trials needed to reach the mastery criterion was used to measure the initial learning task. The means and standard deviations for both number of initial learning trials and percent correct on the transfer test across the six treatment groups are shown in Table 1. Analysis of variance

for the number of trials (Table 2) revealed a significant Method effect ($F = 20.16$, $P < .001$). The initial consonant segmented groups, however, did not differ from the final consonant segmented groups on this measure.

Insert Tables 1 & 2 about here

Table 3 presents an analysis of variance on the percent correct measure on the transfer test. Examination of the table reveals a significant Method effect ($F = 17.41$, $P < .001$). Scheffé comparisons indicate that although the FS and the IS methods did not differ from each other, they both produced significantly superior transferability ($P < .001$) when compared to the US method. While 67.5 percent and 76.3 percent transfer performances were obtained for the FS and IS treatment groups respectively, only 22.5 percent transfer was obtained for the US treatment group.

Insert Table 3 about here

Discussion

The results of the present study indicated that within the limits imposed by the one-to-one setting, LD children taught by either of the two segmented methods performed better in initial learning and transfer than those who were simply given practice in reading unsegmented words. Whereas the word stimuli used in the segmented teaching methods were structured so that the subjects were explicitly directed to attend to the phonetic patterns, the students taught by the unsegmented method would have to induce the patterns underlying the words. Apparently the provision of structural cues is more effective than drill and practice in teaching LD students to read

predictable isolated words.

The findings are, to a great extent, in agreement with the results by Jeffery and Samuels (1967); Jenkins, Bausell, and Jenkins (1972); and Fox and Routh (1976), when letter-like forms were used as the stimuli. However, in the present research, the critical test of the differential effectiveness of the three teaching methods was provdied by the transfer words. In essence, LD children can be expected to read correctly 70 percent of untaught CVC and CVCE words. Segmenting either the final or the initial consonant, therefore, appears to provide a significant reduction in instructional effort required. Unlike Fletcher's study (1973), no advantage was discovered for either method of segmentation. One plausible explanation for the different findings is related to the training methods used. Whereas computer assisted instruction program was used in Fletcher's study, the subjects in this study were mainly trained by flash cards. Conceivably, having the initial consonants segmented is more conducive to transfer when the learning process involves following audio direction and typing the keys.

The present finding suggests that segmentation is an effective teaching approach in the stages of generalization as well as acquisition. In view of the fact that LD students commonly exhibit serious discrepancies of reading, it is absolutely necessary to maximize reading instructional efficiency in the hope these youngsters may begin compensating for their specific deficits in a reasonably short period of time. Otherwise, they will end up playing a catch-up game throughout their school years. Although, the current study addresses itself to one aspect of reading -- sounding out phonetically regular words presented in isolation, it does provide empirical evidence supporting segmentation procedures.

An additional implication with regard to the present finding is that we need to make segmentation an integral part of the phonics teaching process, taking advantage of the learning principles that we know. Such a concern is particularly well-placed since a large number of learning disabled students are to be eventually mainstreamed into regular classes in which they will be given materials different from those used in the special education settings.

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Table 1

Means and Standard Deviations on Number of Learning Trials and Percent of Correct Transfer Responses by Treatment Groups

	Number of trials		Percent correct on transfer	
Treatment Group	X	SD	X	SD
CVC word pattern Final consonant segmented	3.6	1.2	90	1.1
Initial consonant segmented	3.6	1.1	94	1.2
Unsegmented	8.3	2.8	49	2.9
CVCE word pattern Final consonant segmented	2.7	1.0	89	1.1
Initial consonant segmented	3.4	1.4	88	1.3
Unsegmented	6.5	3.6	46	4.6

Table 2

Analysis of Variance Summary Table for Number of Trials

Source of Variation	SS	df	MS	F
Method	179.54	2	89.77	20.16*
Word Pattern	12.00	1	12.00	2.70
Method X Word Pattern	5.38	2	2.69	.60
Residual	187.00	42	4.45	
Total	383.92	47		

*$p < .001$

Table 3

Analysis of Variance Summary Table for Correct Transfer Responses

Source of Variation	SS	df	MS	F
Method	192.79	2	96.40	16.66*
Word Pattern	1.33	1	1.33	.23
Method X Word Pattern	.54	2	.27	.05
Residual	243.00	42	5.79	
Total	437.66	47		

*p < .001